

MORPHOLOGICAL STUDY OF FISSURES AND LOBES OF LUNGS

Dhanalakshmi V ^{*1}, Manoharan C ², Rajesh R ³, Suba Ananthi K ⁴.

^{*1} Senior Assistant Professor, Department of Anatomy, Govt. Thoothukudi Medical College, Thoothukudi, Tamilnadu, India.

² Associate Professor, Department of Forensic Medicine, Government Kanyakumari Medical College, Tamilnadu, India.

³ Professor, Department of Forensic Medicine, Government Thoothukudi Medical College, Thoothukudi, Tamilnadu, India.

⁴ Associate Professor, Department of Anatomy, Indhira Gandhi Institute of Medical Sciences, Pondicherry, India.

ABSTRACT

Introduction: Lungs are essential organs of respiration. Variations in lobes and fissures of lungs are clinically significant. Awareness of these variations is essential during segmental resections of lung. This study is conducted to observe the completeness of fissures, presence of accessory fissures and accessory lobes of lungs.

Materials and Methods: 100 lungs (50 right and 50 left) from embalmed cadavers and autopsied bodies were studied for the presence of normal fissures, its variations including number of lobes, accessory lobes and accessory fissures.

Results: The right lungs had complete oblique fissure and complete horizontal fissure in 68% and 30% respectively. The left lungs had complete oblique fissure 62%. Oblique fissure was incomplete in 32% of right lung and in 38% of left lung. Horizontal fissure was incomplete in 52% and absent in 18%. 73.3% of incomplete oblique fissure of right lung showed incompleteness posteriorly. In the left lung oblique fissure showed incompleteness anteriorly in 26.3%, in the middle in 21.1% and posteriorly in 52.6%. Horizontal fissure of right lung was incomplete anteriorly in 96.2%.

Accessory fissures were present in 4 specimens (8%) of right lungs and in 1 specimen (2%) of left lung and accessory lobes were present in 2 specimens (4%) of right lungs.

Conclusion: The fissures in normal lungs enhance uniform expansion of lobes. Absence of fissures can affect the expansion of the lungs. Incomplete fissures may also alter the spread of disease within the lung. Knowledge of accessory fissure and variations in lobes and fissures of lung are important as it may mislead while interpreting in radiology.

KEY WORDS: Accessory, Fissure, Lobes, Lung, Variation.

Address for Correspondence: Dr. Dhanalakshmi V, M.D (Anatomy), Senior Assistant Professor, Department of Anatomy, Govt. Thoothukudi Medical College, 3rd Mile, Kamaraj Nagar, Thoothukudi, Tamilnadu, India – 628008 **E-Mail:** drlakshmidhana@gmail.com

Access this Article online

Quick Response code



DOI: 10.16965/ijar.2016.104

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 02 Jan 2016 Accepted: 29 Jan 2016
Peer Review: 03 Jan 2016 Published (O): 29 Feb 2016
Revised: None Published (P): 29 Feb 2016

INTRODUCTION

Lungs are one of the vital organs of human body. Right lung is divided into superior, middle and

inferior lobes by oblique and horizontal fissure. Oblique fissure separates inferior from middle and upper lobes. Right oblique fissure crosses

the inferior border of right lung approximately 7.5cm behind its anterior end. On the posterior border, it is either at level of 4th thoracic spine or slightly lower. The horizontal fissure separates upper and middle lobes. It passes from the oblique fissure near the mid axillary line horizontally forwards to anterior border of lung, then passes backward to hilum on mediastinal surface. Left lung is divided into superior and inferior lobe by an oblique fissure which extends from the costal to medial surface of lung both above and below the hilum [1].

The visceral or pulmonary pleura adheres closely into pulmonary surface and its interlobar fissure. The fissure can be complete or incomplete. In complete fissure the lobes remain held together only at the hilum by bronchi and pulmonary vessels [Fig.1&2]. It is said to be incomplete when there are areas of parenchymal fusion between the lobes or the entire fissure may be absent [2].

Knowledge of anatomy of the fissures of lung and identification of its completeness is essential prior to lobectomy and also for understanding their variable appearances on radiological investigations.

MATERIALS AND METHODS

After obtaining ethical clearance, 100 lungs (50 right and 50 left) procured from embalmed cadavers of Department of Anatomy and autopsy specimens from Department of Forensic Medicine of Government Thoothukudi Medical College were studied for the presence of normal fissures, its variations, number of lobes, accessory lobes and accessory fissures. Completeness of a fissure is determined as per the grading given by Craig and Walker [3]. The measurements were taken with inch tape and photographed.

RESULTS

The right lung was normal with complete oblique fissure in 68% and complete horizontal fissure in 30%. The left lung was normal with complete oblique fissure 62%. In right lung, oblique fissure was incomplete in 32% [Fig: 3] and horizontal fissure was incomplete in 52% and absent in 18% [Fig: 4]. In 38% of left lung, oblique fissure was incomplete. 73.3% of incomplete oblique fissure of right lung showed

incompleteness posteriorly. In the left lung oblique fissure showed incompleteness anteriorly in 26.3%, in the middle in 21.1% and posteriorly in 52.6%. Horizontal fissure of right lung was incomplete anteriorly in 96.2%.

Accessory fissures were present in 4 specimens (8%) of right lungs [Fig: 5 & 6] and in 1 specimen (2%) of left lung and accessory lobes were present in 2 specimens (4%) of right lungs [Fig: 6 & 7].

Fig.1: Normal oblique and horizontal fissures (arrows) of right lung.

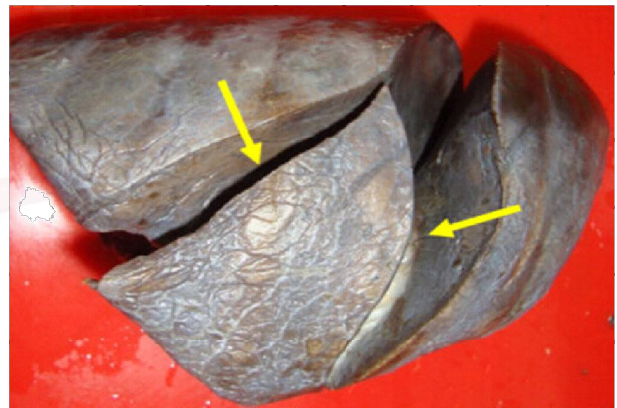


Fig.2: Normal oblique fissure of left lung.



Fig.3: Incomplete oblique fissure of right lung



Fig. 4: Absent horizontal fissure of right lung



Fig.5: Accessory fissure present in right lung along diaphragmatic surface (arrow)

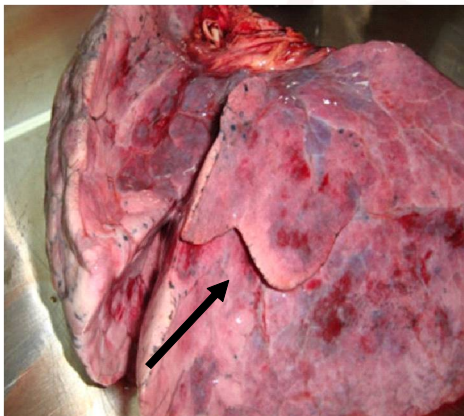


Fig.6: Multiple accessory fissure in right lung and accessory lobe.



Fig.7: Right lung showing four lobes.

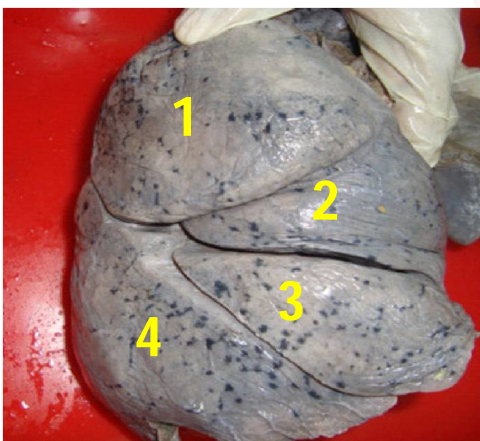


Table 1: Incidence of grades of completeness of oblique and horizontal fissures of lungs observed (according to Craig and Walker criteria).

Side of the Lung	Fissures	Grade I	Grade II	Grade III	Grade IV
Right Lung	Oblique fissure	62%	32%	6%	0%
	Horizontal fissure	30%	28%	24%	18%
Left Lung	Oblique fissure	62%	30%	8%	0%

DISCUSSION

Anomalies of lobation of the lungs may be produced by fusion of adjacent lobes to obliterate a fissure, by the occurrence of abnormal fissures or by the aplasia or agenesis of a part of a lung. Horizontal fissure is most commonly incomplete at its anterior end [4].

Each terminal lobe of the endodermal outgrowth together with the surrounding splanchnopleuric mesenchyme constitutes a lung bud from which all the tissues of the corresponding lung and bronchial tree will be derived. Right lung bud possesses three bronchial tubes, while the left has only two. On subsequent development the stem bronchi divide dichotomously. Occasional monopodial branching of the stem bronchi account for the accessory bronchi and lobes [5].

Table 2: Incidence of variations in fissures of lung reported by various authors are.

Author	Lung	Fissure	Incomplete	Absent
Radha K et al. 2015 [8]	Right	Horizontal	43%	17%
		Oblique	17%	0%
	Left	Oblique	23%	0%
Prakash et al. 2010 [12]	Right	Horizontal	50%	7.10%
		Oblique	39.30%	7.10%
	Left	Oblique	35.70%	10.70%
Muralimanju et al. 2012 [13]	Right	Horizontal	46.90%	18.70%
	Left	Oblique	7.10%	3.60%
Present study	Right	Horizontal	52%	18%
		Oblique	32%	0%
	Left	Oblique	38%	0%

Completeness of a fissure is determined as per the grading given by Craig and Walker. Grade 1- complete fissure with entirely separate lobes; grade 2- complete visceral cleft but parenchymal fusion at the base of the fissure; grade 3- visceral cleft evident for part of the fissure; grade 4- complete fusion of the lobes with no evident fissural line.

Gradation of fissures is important surgically. Ligation of the vessels and bronchi are approached through the depth of the fissures by the surgeons. Grade I oblique fissure makes the approach easy while doing lobectomy and in video assisted thoracoscopic surgery. Otherwise the lung parenchyma has to be dissected to reach those structures leading to preoperative hemorrhage and postoperative complications [6].

Incomplete fissures may also alter the spread of disease within the lung. In patients with incomplete fissures, pneumonia may spread to adjacent lobes through the incomplete fissures. Incomplete fissure may alter the usual patterns of collapse seen in patient with endobronchial lesions. An incomplete major fissure can cause the odd appearance of fluid tracking within the fissure [7].

Accessory fissures can be mistakenly confused with areas of linear atelectasis, pleural scars, or walls of bullae [8]. The fissures in normal lungs enhance uniform expansion of lobes. Absence of fissures can affect the expansion of the lungs.

An accessory fissure is important as it can be mistaken for a lung lesion while interpreting in radiology [9]. In X-ray, incomplete fissure always give an atypical appearance of pleural effusion. Sometimes the accessory fissures are failed to be detected on CT scans, because of their incompleteness, thick sections and orientation in relation to a particular plane. An incomplete fissure is also a cause for postoperative air leakage. The lobes of lungs show partial fusion as a result of incomplete pulmonary fissures [10].

Lymphatics of lung drain centripetally from pleura towards the hilum. Altered course of oblique fissure would mean altered course of visceral pleura, thereby changing the arrangement of lymphatic drainage [11].

CONCLUSION

Awareness regarding anatomical variations is essential for performing lobectomies, segmental resection and interpreting radiological images. Further studies correlating the variations of fissures and lobes of lungs with the bronchopulmonary segments will be significant and has to be carried out on larger extent.

Conflicts of Interests: None

REFERENCES

- [1]. Susan Standring: Gray's Anatomy.40th edition. Elsevier Limited: churchill Livingstone; 2008.1068-70.
- [2]. Jadhav Mayuri, Pawar Pradeep, Mikam Vasudha, Tawte Aparna, Mane Smita. Anomalous Lobar Pattern of Right Lung: A case report. Journal of Research in Medical and Dental Science 2013;1(2).
- [3]. Craig SR, Walker WS. A proposed anatomical classification of the pulmonary fissures: J R Coll Surg Edinb. 1997, Aug;42(4):233-4.
- [4]. W.Henry Hollinshead: Anatomy for Surgeons. The Thorax, Abdomen and Pelvis. volume.2: 2nd edition. Harper &Row publishers; p-72.1971,
- [5]. Hamilton W.J: Mossman H.W.Human Embryology prenatal development of form and function. 4th edition. MacMillan press Ltd: London; 328-330. 1976
- [6]. K. Lakshmi Kumari, K. Deena Usha Kumari, D: Asha Latha Morphological Variations of Fissures of Lungs. IOSR Journal of Dental and Medical Sciences Nov. 2015;14 (11) Ver. IV:50-53.
- [7]. Meenakshi S, Manjunath KY, Balasubramanyam V. Morphological variations of the lung fissures and lobes. Indian J Chest Dis Allied Sci. 2004 Jul-Sep; 46(3):179-82.
- [8]. Radha K, Durai Pandian K. Fissures and lobes of lungs. a morphological and anatomical study. International Journal of Anatomy and Research 2015;3(2):995-98.
- [9]. Suja Mary Jacob & Minnie Pillay. Variations in the Inter-lobar Fissures of Lungs Obtained from Cadavers of South Indian Origin. Int. J. Morphol. 2013;31(2):497-499.
- [10]. Zareena.SK. A study of morphology and variations of lungs in adults and foetus. International Journal of Advancements in Research & Technology. April-2014;3(4).
- [11]. Sumita Dutta, Lopamudra Manda, Sanjay Kumar Mandal, Jayanta Biswas, Ansuman Ray, Manimay Bandopadhyay. Natural fissures of lung-anatomical basis of surgical techniques and imaging. National journal of medical research. Apr – June 2013;3(2):117.
- [12]. Prakash, Bhardwaj AK, Shashirekha M, Suma HY, Krishna GG, Singh G. Lung morphology: a cadaver study in Indian population. Ital J Anat Embryol.2010;115(3):235-40.
- [13]. Muralimanju B V, Prabhu LV, Shilpa K, Pai MM, Kumar CG, Rai A, Prashanth KU. Pulmonary fissures and lobes: a cadaveric study with emphasis on surgical and radiological implications. Clin Ter.2012; 163(1):9-13.

How to cite this article: Dhanalakshmi V, Manoharan C, Rajesh R, Suba Ananthi K. MORPHOLOGICAL STUDY OF FISSURES AND LOBES OF LUNGS. Int J Anat Res 2016;4(1):1892-1895. DOI: 10.16965/ijar.2016.104